β* measurement and knobs – test in blue

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Preparation

Calculated and prepared b* knobs for blue (MADX→RE) limit 12%

Checked RE model prediction for effects on mach parameters

Experiments test in blue (february 25):

- Center orbit in IR8, separate tunes
- Varied bo7-qd1 and bi8-qd1 by $-\Delta K$ and $+\Delta K$ in the range from 0 to 0.001 in steps of 0.0001 and took (PLL) tune shift data for β* measure (anti-symmetric excitation minimizes beta-beat for symmetric optics – more later on that)
- Tried out the beta* knobs at 5%, 10% and 12% (present limit) without lifetime degradation
- Measured dispersion and beta around the ring (AC dipole) to evaluate beta beating for different knobs levels

IR PS:

- IR supplies needs to be ramped slow (slowfactor 25+) 8b-qd1 QLI'ed during the first attempt to ramp knob to 12% (slowfactor 8)
- bi8-qf9 PS exceeded limits of 150A (166A)→leads problem (Ganetis)
  knobs will be modified to avoid that

Knobs could be ramped up to 12% without obvious problem with other machine parameters

No apparent hysteresis (checked by switching knobs on and off)

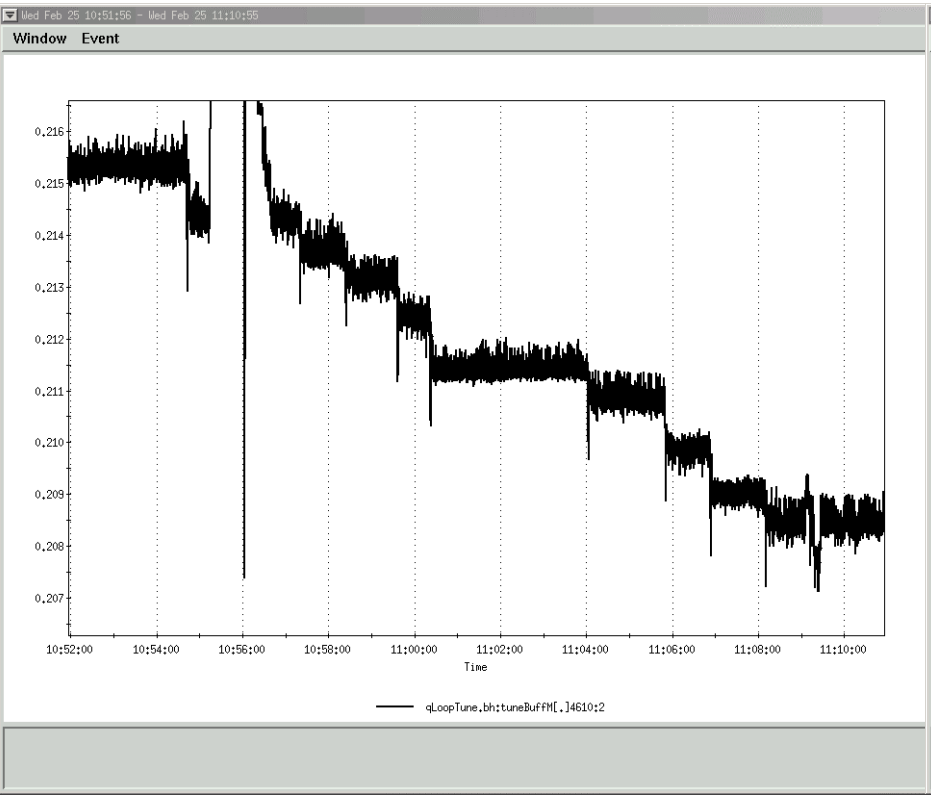
No observed effect on rates when we had beams in collisions (6 bunches in blue, 3 in yellow, no IR steering – etc.)

Analysis of beta* data in progress:

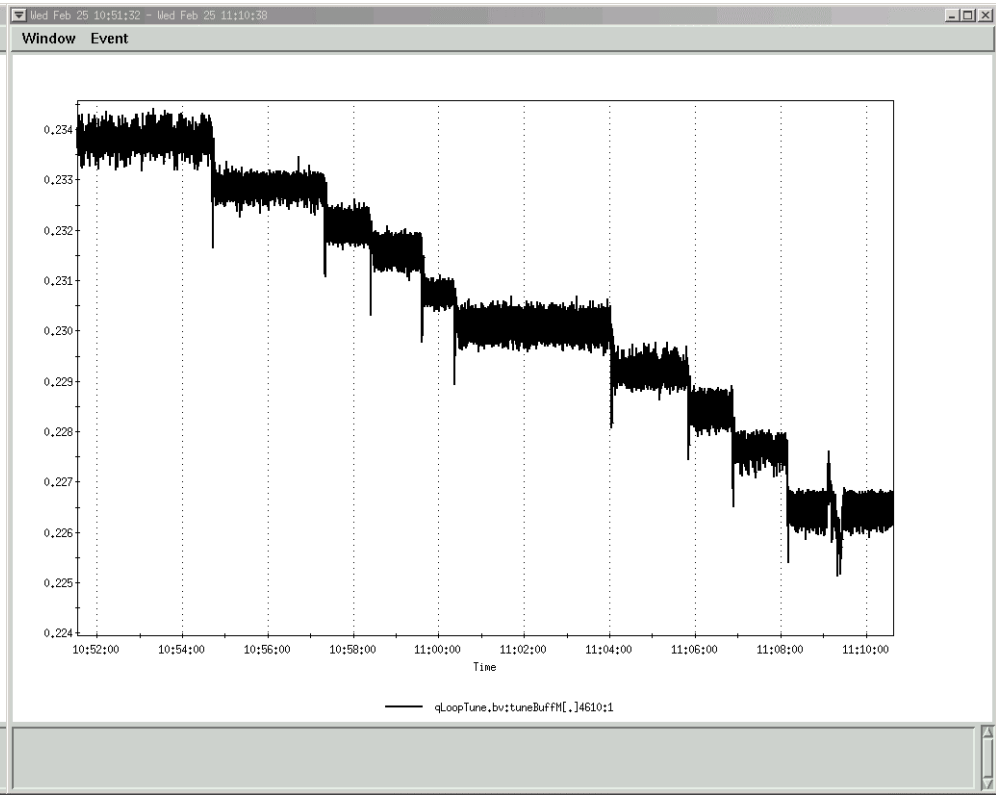
- (verify the quadratic dependence, assess impact of anti-symmetric optics)→measured beta* value
- Correlate AC dipole and dispersion measurements
- Calculation of new knobs (including triplet power supplies) to redistribute strength, avoid PS limits, possibly increase knob range to 15%-20?%

DK scan in q1's in blue IR8

Horizontal tune



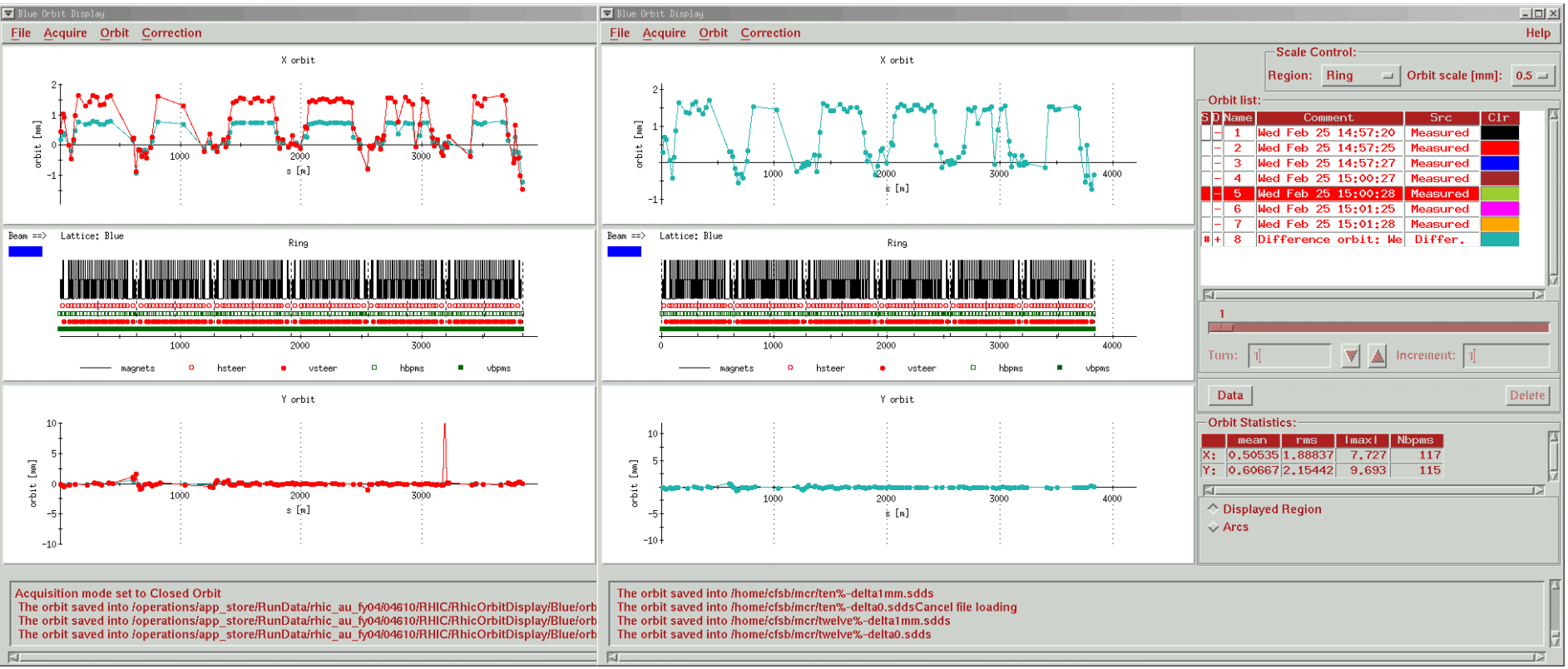
Vertical tune



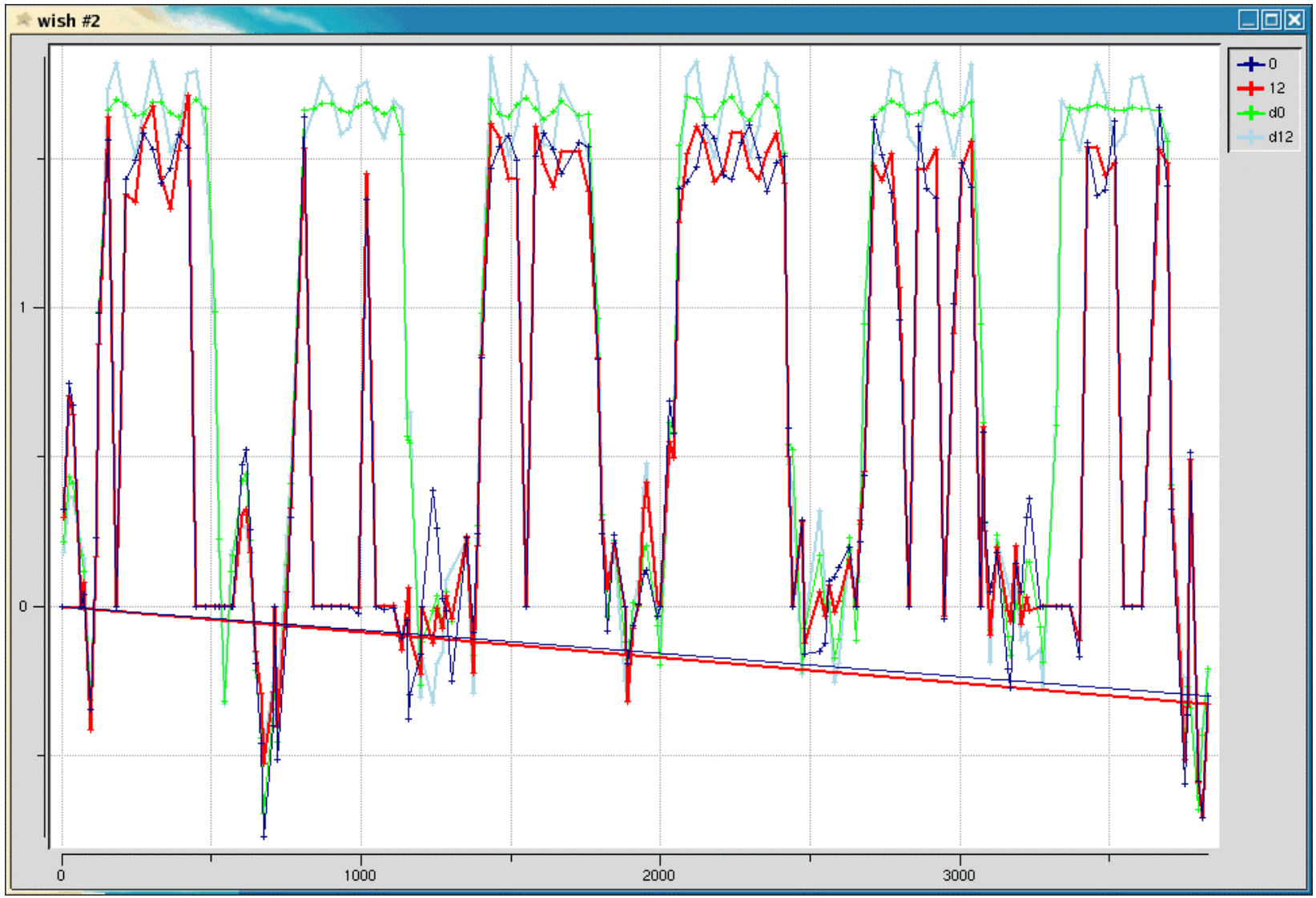
dispersion

baseline

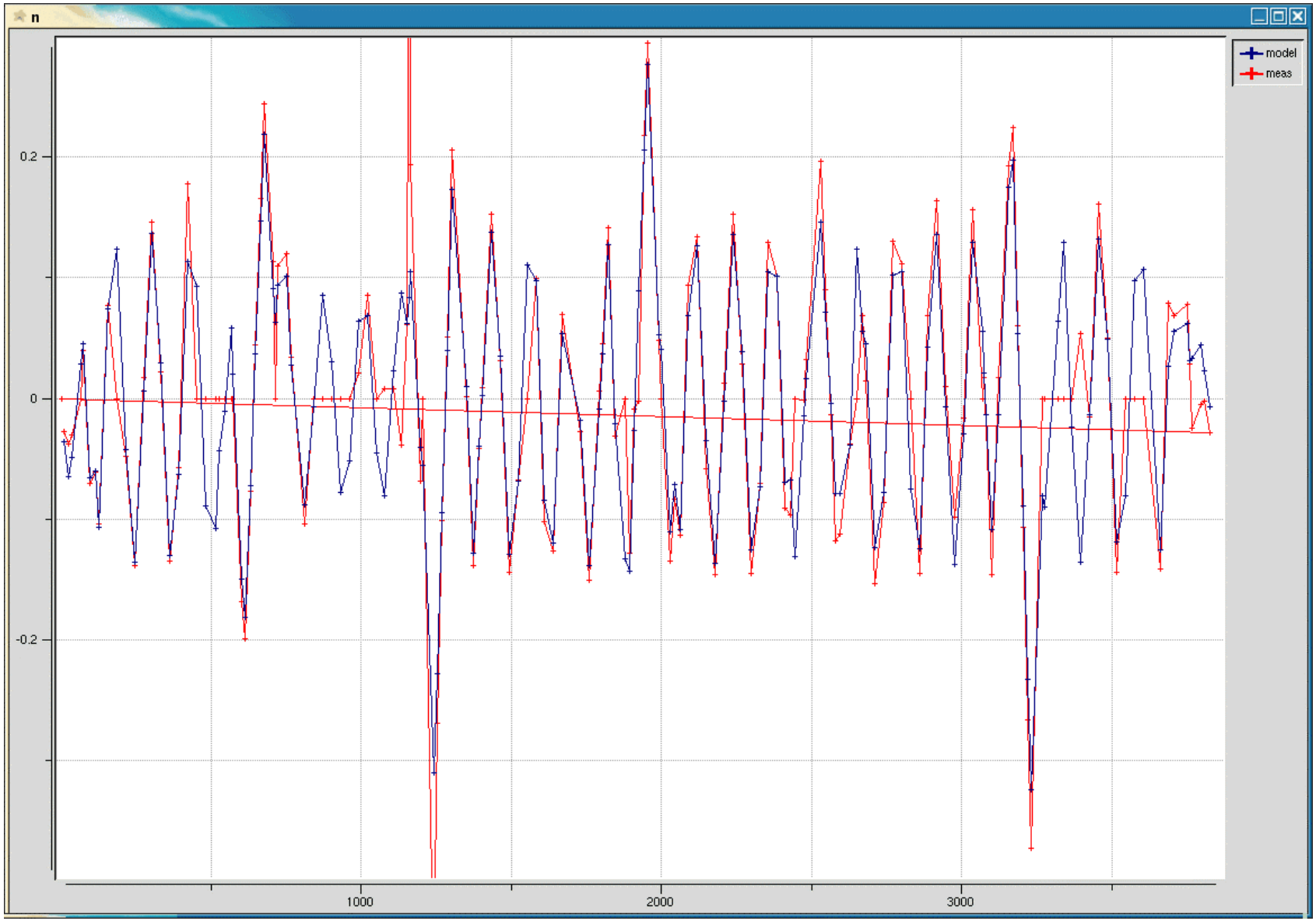
12% knob



Model vs. measurements for knobs on and off
The error do not come from the knobs→



Prediction for the dispersion effect coming from the knob vs. measurement→remarkable agreement



Plan next week

- 6 bunch ramp to test blue and yellow knobs, dispersion and beta measurements
- 45x45 ramp – nominal – to check effects on rates

  start with nominal, steer

  ramp up knobs, steer (LISA if possible, OrbitDisplay otherwise)

  compare Phenix/Star rates

  confirm with Vernier scans